PENNSYLVANIA RAILROAD, 52nd STREET BRIDGE
Pennsylvania Historic Railroad Bridges Recording Project
N. Fifty-second St. at Lancaster Ave.
Philadelphia
Philadelphia County
Pennsylvania

HAER No. PA-546

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
1849 C Street, NW
Washington, DC 20240

HAER
PA
51-PHILA,
722-

HISTORIC AMERICAN ENGINEERING RECORD

PENNSYLVANIA RAILROAD, 52nd STREET BRIDGE

HAER No. PA-546

Location:	N. Fifty-Second St. at Lancaster Ave., Philadelphia, Philadelphia County, Pennsylvania
USGS Quadrangle:	Philadelphia, Pennsylvania-New Jersey (7.5-minute series).
UTM Coordinates:	18/480640/4425100
Date of Construction:	1902.
Basis for Dating:	Construction contract.
Designer:	William H. Brown (Chief Engineer, Pennsylvania Railroad).
Fabricator / Builder:	American Bridge Co., Pencoyd plant (Philadelphia).
Present Owner:	National Railroad Passenger Corporation (Amtrak).
Present Use:	Railroad bridge.
Structure Types:	Pin-connected Parker through truss; riveted Warren deck truss; deck girder.
Significance:	The 52nd Street Bridge's main span, a pin-connected Parker through truss, is an exceptionally long example of its type at 387'-10". Its length surpasses the practical limit of 300'-0", beyond which a subdivided Pennsylvania truss was commonly used instead. The span and its approaches are integral to the 52nd Street Station complex, rebuilt during the Pennsylvania Railroad's campaign to separate passenger and freight traffic in the 1900s.
Historian:	Justin M. Spivey, April 2001.
Project Information:	The Historic American Engineering Record (HAER) conducted the Pennsylvania Historic Railroad Bridges Recording Project during 1999 and 2000, under the direction of Eric N. DeLony, Chief. The project was supported by the Consolidated Rail Corporation (Conrail) and a grant from the Pennsylvania Historical and Museum Commission (PHMC). Justin M. Spivey, HAER

engineer, researched and wrote the final reports. Preston M. Thayer, historian, Fredericksburg, Virginia, conducted preliminary research under contract. Jet Lowe, HAER photographer, and Joseph E. B. Elliott, contract photographer, Sellersville, Pennsylvania, produced large-format photographs.

Description and History

The 52nd Street Station complex is the product of two generations of grade-separation efforts. Like many American cities in the late nineteenth century, Philadelphia required railroads to remove their tracks above city streets. This policy resulted in an elevated embankment carrying the main line of the Pennsylvania Railroad (PRR) parallel to Lancaster Avenue.[1] The railroad's Schuylkill Division diverged from the main line west of 52nd Street, turning sharply northward on its way to Reading. In the opposite direction, Schuylkill Division trains had to cross over outbound main-line tracks on their way into Philadelphia. To eliminate this conflict, PRR engineering staff devised a three-level junction in 1901. Their design separated not only inbound and outbound trains, but also freight and passenger traffic, reflecting a growing sophistication of operations. This project was preliminary to a massive program of improvements proposed by PRR President Alexander J. Cassatt in 1902. Over the following decade, the railroad constructed a new low-grade line between Trenton and Harrisburg, separating freight and passenger traffic throughout eastern Pennsylvania.[2]

Reconstruction of the 52nd Street junction added levels above and below the existing elevated tracks. The PRR carved a tunnel through the embankment, allowing inbound Schuylkill Division trains to cross beneath. After moving main-line passenger tracks to the outer edges of the embankment, crews constructed a new freight receiving yard in the middle. The subject of this report is a single-track fly-over bridge built to carry outbound passenger trains (both main line and Schuylkill Division) across the throat of the freight yard. The 52nd Street passenger station was split into two levels, with the outbound platform forming an integral part of the bridge's eastern approach.[3] The American Bridge Company fabricated the steel superstructure at its nearby Pencoyd plant, which it had recently acquired from the Pencoyd Iron Works. Given that PRR engineers were debating the design in mid-1901, erection work must have proceeded quickly in order for the completed structure to be described by *Engineering Record* in October 1902. American Bridge was paid on 20 December, at a rate of 3.5 cents per pound of steel.[4]

The fly-over bridge's most remarkable feature is an exceptionally long pin-connected Parker through truss span over the freight tracks. It crosses the freight tracks at an extreme skew, but is framed square, perhaps to simplify design and construction. The Parker truss has diagonals in tension and inclined end posts like the Pratt truss, but uses material more efficiently in a polygonally curved upper chord. The 52nd Street Bridge's Parker truss is 45'-0" deep at mid-span and measures 387'-10" from center to center of its endmost pins. This exceeds the commonly accepted practical limit of 300'-0" for the Parker type.[5] Internal correspondence suggests a reason for the extreme length. On 7 June 1901, the superintendent of PRR's

Philadelphia Terminal Division requested that Chief Engineer William H. Brown accommodate a minimum of six freight tracks beneath the fly-over. In rebuttal to Brown's response that four tracks should suffice, the superintendent remarked, "We infer that you have gone to the limit with one span."[6] Perhaps with injured pride, Brown instructed his engineering staff to stretch the Parker truss to its limits.

The 52nd Street Bridge is not the only PRR structure to push the Parker truss envelope. It has a slightly shorter sibling, a 373'-1" span at Whitford, built later in PRR's passenger-freight separation campaign. In describing the latter bridge, Conrail Chief Engineer James T. Sullivan noted that "a good many designers would have transferred to Pennsylvania truss construction" for this span length.[7] Because the 52nd Street Bridge's Parker truss has only thirteen equal panels of 29'-10", its stringers must be exceptionally heavy 30"-deep built-up members to carry loads between panel points.[8] The Whitford Bridge, with eleven 33'-11" panels, has even deeper stringers. In both cases, a Pennsylvania truss design would have been more efficient by providing a secondary system of diagonals to support intermediate floor beams.

The eastern approach to the Parker truss, which merited a separate description in *Engineering Record,* consists of forty-eight deck girder and truss spans. These spans were somewhat unusual at the time because they lacked floor beams and stringers, and the track was not directly connected to the structure. Instead, Z-bars are riveted together into a trough-type floor, similar to a modern orthotropic deck, which serves as a tray for ballast. Starting at the east end, thirty-three riveted deck girder spans ascend a 1.5 percent grade, followed by five deck girder spans on a level grade, then a 105'-0"-long, 15'-0"-deep riveted Warren deck truss over 52nd Street. Between 52nd Street and the Parker truss are nine more deck girder spans, the last seven of which are on a 6-degree curve. All of the deck girders are built-up steel plate girders 4'-8-1/2" deep, with lengths ranging between 32'-0" and 37'-0". Most spans are supported by two lines of girders spaced 8'-0" on center, except those in the vicinity of 52nd Street, which have a third line of girders 6'-0" further south to support the station platform. The span directly over 52nd Street has two lines of trussing, 13'-0" on center, with the platform cantilevered off the south truss. The western approach is an earth-filled embankment with rock-faced ashlar sandstone retaining walls. This same material is used in the piers supporting the eastern approach spans.[9]

Notes

1. The PRR's main line followed a different route via Belmont until it acquired the West Philadelpbia Railroad's Lancaster Avenue route in 1838; see John C. Trautwine, Jr., "The Philadelphia and Columbia Railroad of 1834," *Philodelphio History* 2, No. 7 (1925), in folder "Railroads in Park - General," Fairmount Park Commission Archives, Philadelphia, Pa.

2. Howard W. Schotter, *The Growth ond Development of the Pennsylvonio Roilrood Company: A Review of the Charter ond Annuol Reports of the Pennsylvania Roilroad Compony 1846 to 1926* (Philadelphia: Press of Allen, Lane, and Scott, 1927), 281-82.

3. S. A. Whinery, "lmprovements on the Pennsylvania Railroad." *Roilroad Gazette* 47, No. 13 (27 Mar. 1903): 222-23.

4. Agreement No. 3054, "The American Bridge Co. with the Penna. R. R. Co. for 387'-10" span over Freight Yard, 52nd. St. West Phila., Dated Dec. 17. 1901," in folder "Philadelphia - 52nd Street 1882-1902," Box 752, Construction Contracts, Engineering Department, Pennsylvania Railroad Company records, Acc. 1807, Hagley Museum and Library, Greenville, Del.

5. See T. Allan Comp and Donald Jackson, "Bridge Truss Types: A Guide to Dating and Identifying," *History News* 32, No. 5 (May 1977): Technical Leaflet No. 95.

6. Superintendent, Philadelphia Terminal Division, to William H. Brown, Chief Engineer, 7 June 1901 and 17 June 1901, in folder "52nd Street - Track & Line Changes 1883-1903," Box 1742, Chief Engineer, Engineering Department, Pennsylvania Railroad Company records, Acc. 1807, Hagley Museum and Library, Greenville, Del.

7. See James T. Sullivan, Chief Engineer, Design & Construction, Consolidated Rail Corp., to Diane S. Snyder, 5 June 1984, Milepost 27.76, region/division/branch 101122, correspondence files, Consolidated Rail Corp., Philadelpbia, Pa. [transferred to Norfolk Southern Railway Co., Atlanta, Ga.], cited in U.S. Department of the Interior, Historic American Engineering Record (HAER) No. PA-522, "Whitford Bridge," 2000, Prints and Photographs Division, Library of Congress, Washington, D.C.

8. "The Pennsylvania R. R. Bridge at Fifty-second Street, Philadelphia," *Engineering Record* 46, No. 17 (25 Oct. 1902): 398.

9. Dimensions culled from "The Approach to the Pennsylvania Railroad Bridge at Fifty-second Street, Philadelphia." *Engineering Record* 47, No. 7 (14 Feb. 1903): 174-76.

Additional Sources

1. National Railroad Passenger Corporation (Amtrak) archives, Philadelphia, Pa.

2. Pennsylvania Railroad scrapbook, p. 227, Larry Woolsten collection, Railroad Museum of Pennsylvania, Pennsylvania Historical and Museum Commission, Strasburg, Pa.